

US008068450B2

(12) **United States Patent**
Kozisek

(10) **Patent No.:** **US 8,068,450 B2**
(45) **Date of Patent:** **Nov. 29, 2011**

(54) **SYSTEM AND METHOD FOR PROVIDING AGGREGATED WIRELESS COMMUNICATIONS SERVICES**

(75) Inventor: **Steven E. Kozisek**, Leawood, KS (US)

(73) Assignee: **Embarq Holdings Company, LLC**, Overland Park, KS (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 726 days.

(21) Appl. No.: **11/656,775**

(22) Filed: **Jan. 23, 2007**

(65) **Prior Publication Data**

US 2008/0175188 A1 Jul. 24, 2008

(51) **Int. Cl.**
H04W 4/00 (2009.01)

(52) **U.S. Cl.** **370/328; 455/410; 455/411; 455/3.01; 455/552.1; 455/557**

(58) **Field of Classification Search** **370/328; 713/150, 153; 455/410, 411, 3.01, 552.1, 455/556.1, 557**

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,117,526	B1 *	10/2006	Short	726/5
7,376,098	B2 *	5/2008	Loeffler et al.	370/329
7,409,201	B2 *	8/2008	Maria et al.	455/403
7,444,669	B1 *	10/2008	Bahl et al.	726/3
2006/0064497	A1 *	3/2006	Bejerano et al.	709/228
2007/0082654	A1 *	4/2007	Hovnanian et al.	455/410
2009/0022152	A1 *	1/2009	Henry et al.	370/389

* cited by examiner

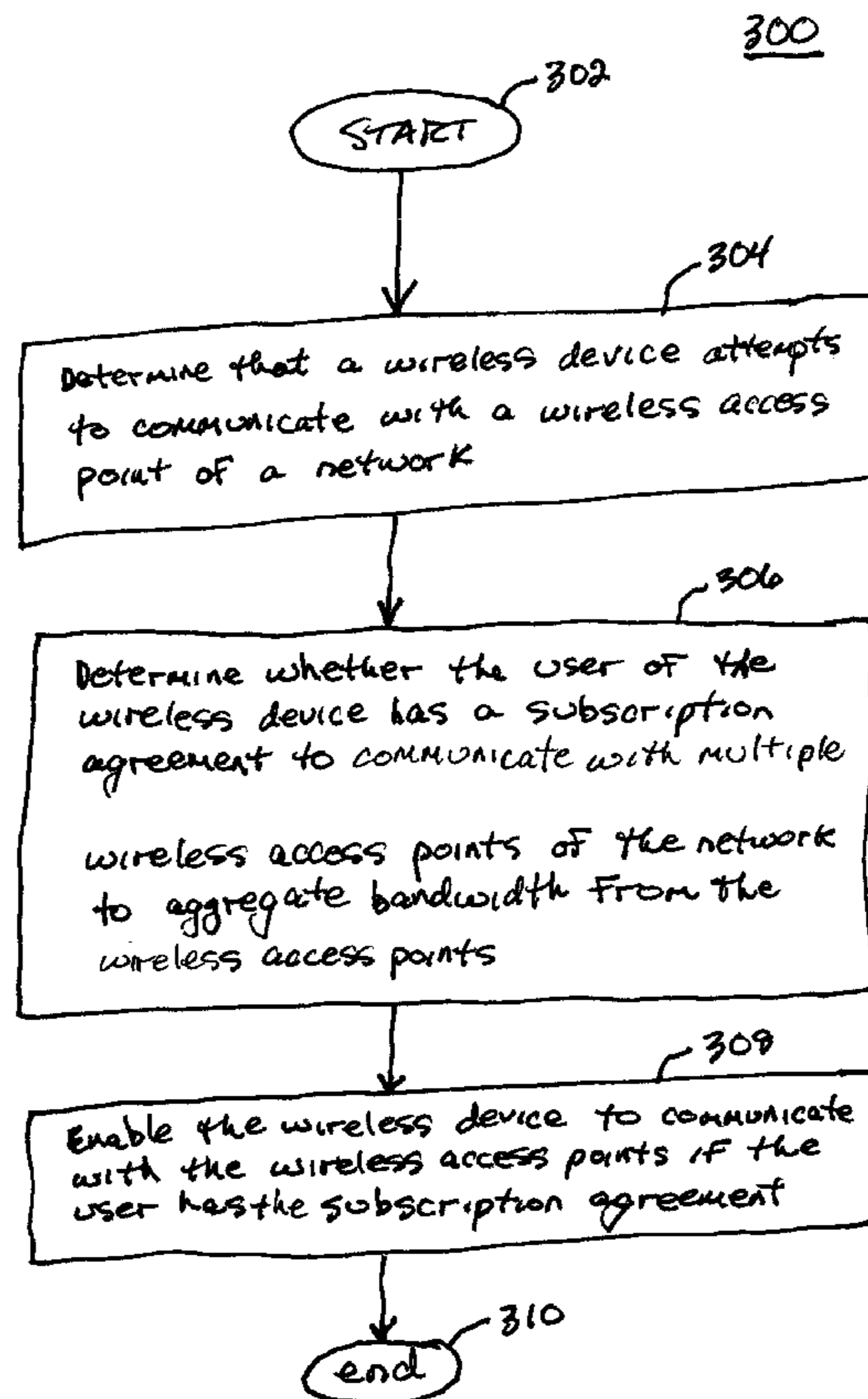
Primary Examiner — Temica M Beamer

(74) Attorney, Agent, or Firm — SNR Denton US LLP

(57) **ABSTRACT**

A system and method for enabling users of wireless devices to increase wireless communication bandwidth may include a server in communication with multiple wireless access points. The server may execute software configured to enable a wireless device to communicate with multiple wireless access points of a network during a communications session. The software, in response to determining that the wireless device attempts to communicate with a wireless access point of the network, determines whether the user of the wireless device has a subscription to communicate with multiple wireless access points to aggregate bandwidth from the wireless access points, and enables the wireless device to access the network and communicate with the wireless access points if the user has the subscription agreement.

20 Claims, 4 Drawing Sheets



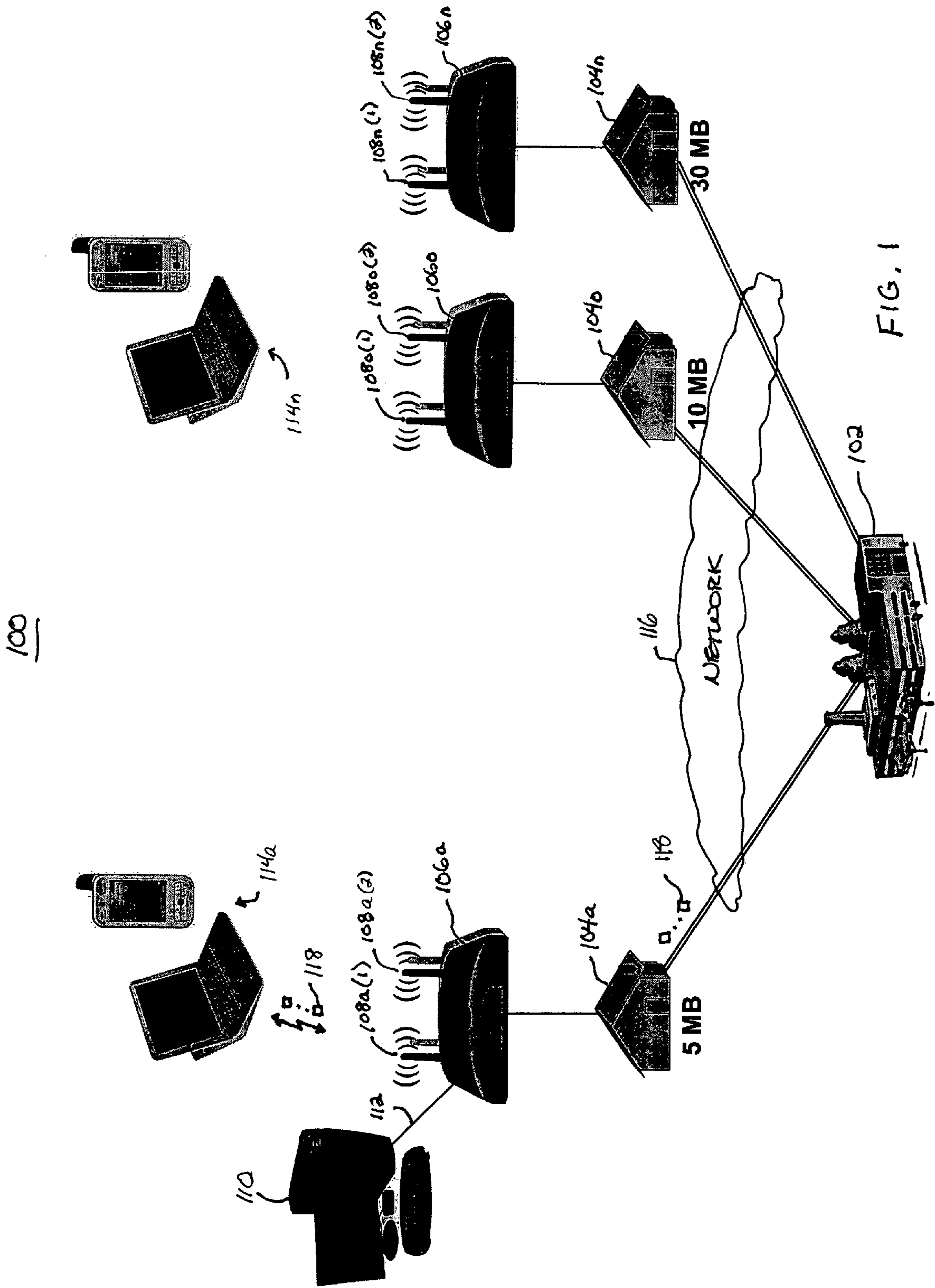


FIG. 1

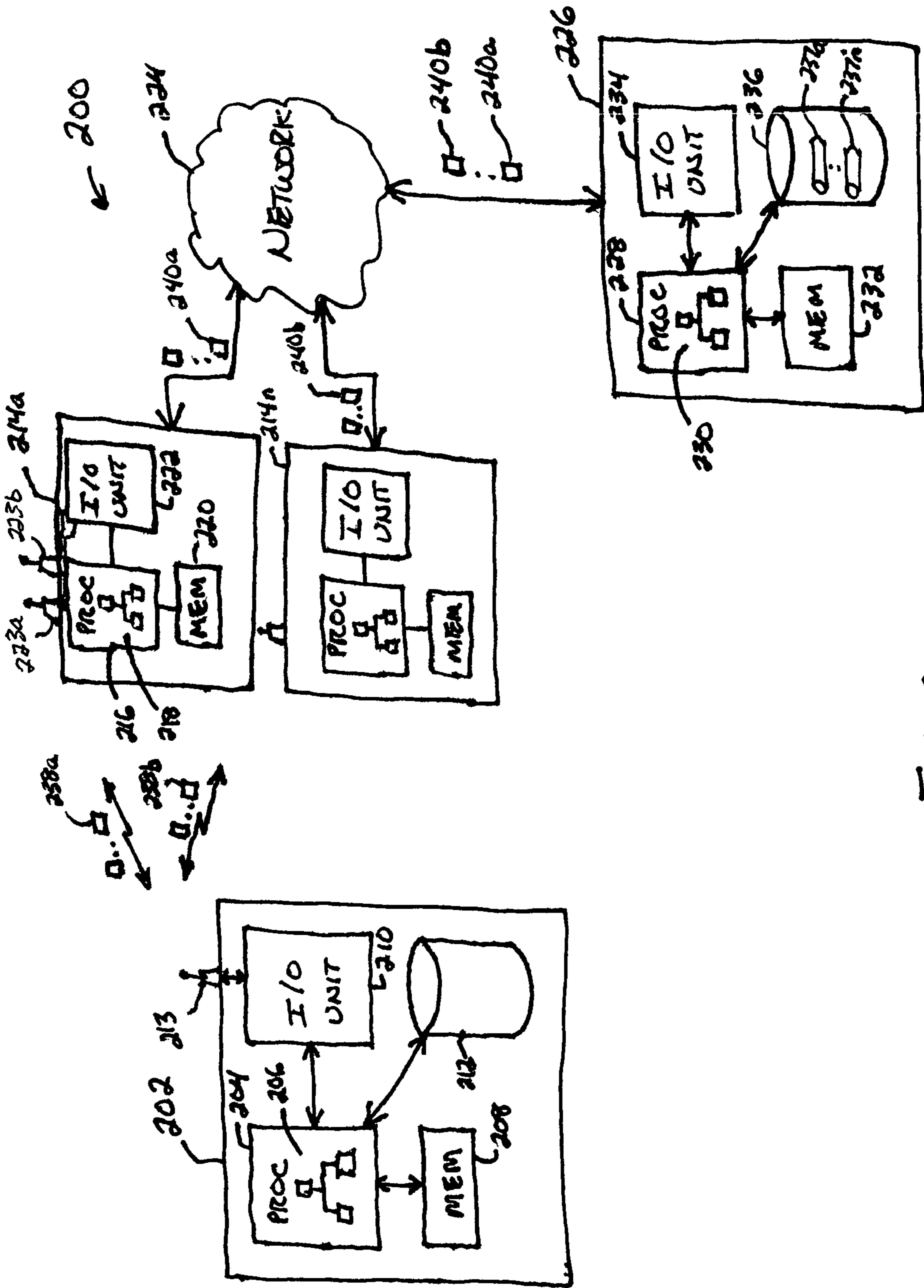


FIG. 2

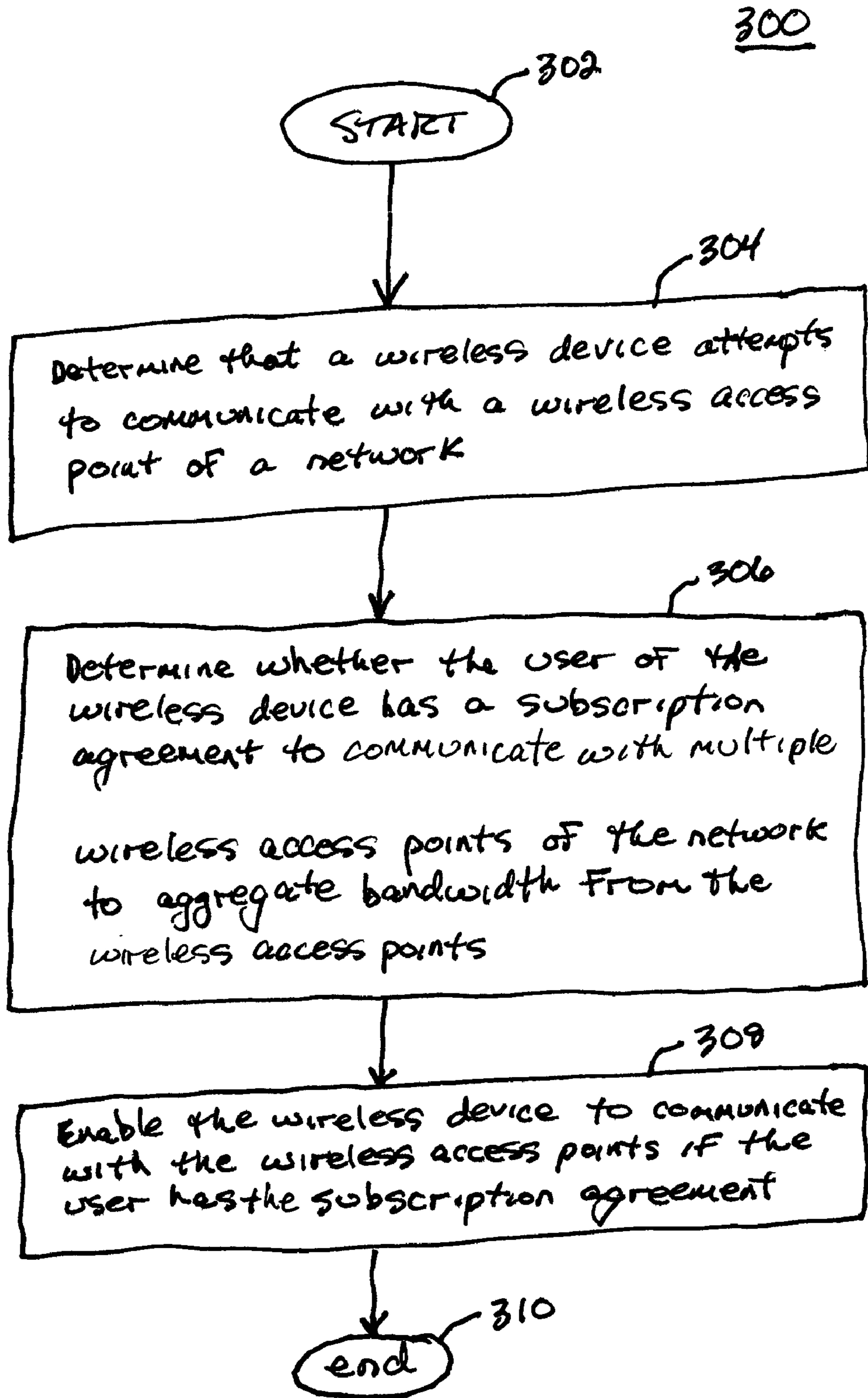


FIG. 3

File Edit View Favorites Tools Help					
Back	Forward	STOP	REFRESH	HOME	SEARCH
Addr: http://www.emberg.com/aggregate_login					
WIRELESS AGGREGATION NETWORK					
LOGIN					
USER NAME:	<input type="text"/>				
PASSWORD:	<input type="text"/>				
(NOT A SUBSCRIBER)					
ENTER YOUR LOGIN INFORMATION TO UTILIZE WIRELESS AGGREGATION OF BANDWIDTH.					

FIG. 4

File Edit View Favorites Tools Help					
Back	Forward	stop	Refresh	Home	Search
Addr: http://www.emberg.com/aggregate_access					
WIRELESS AGGREGATION NETWORK					
ACCESS PASS					
YOU ARE ATTEMPTING TO ACCESS A WIRELESS NETWORK THAT PROVIDES AGGREGATION OF BANDWIDTH, SINCE YOU ARE NOT A SUBSCRIBER, PLEASE ENTER PAYMENT INFORMATION FOR 24 HOUR ACCESS TO THE NETWORK					
PAYMENT TYPE:	<input type="text" value="MASTERCARD"/>				
NAME:	<input type="text" value="DAVID NITKIN"/>				
EXP:	<input type="text" value="09/09"/>				

FIG. 5

SYSTEM AND METHOD FOR PROVIDING AGGREGATED WIRELESS COMMUNICATIONS SERVICES

BACKGROUND

Wireless communications have become pervasive in recent years. At first, telecommunications provided cordless handsets to enable consumers to use a home telephone without being restricted by a telephone cord. Mobile telephones further provided freedom to consumers by enabling them to use a telephone while away from home. Finally, computers that were once attached to a wall socket to communicate over the Internet became wireless through the use of wireless routers and other wireless access points.

While wireless routers have enabled computer users to access the Internet with unprecedented freedom, bandwidth of these routers are relatively slow. Today's technology provides users with 50 megabit (MB) per second communications. However, these speeds are relatively slow when downloading large amounts of content, such as a movie.

A number of bandwidth expansion products have been developed to increase bandwidth to subscribers. One such product provides a subscriber with a device to aggregate bandwidth from local wireless routers. Essentially, communication with each local wireless router is performed in parallel.

One situation that has developed by wireless routers becoming so pervasive is non-subscribers accessing wireless routers and services being paid by neighbors. This situation arises when a subscriber does not password protect access to the wireless router. In the case of a non-subscriber accessing a subscriber's wireless router, this act is considered theft of wireless communications services. In the case where the subscriber knowingly allows for other non-subscribers to access the wireless router, such an act is generally prohibited by the service agreement between the service provider and the subscriber. The act of bandwidth pooling by non-resellers, such as residential consumers, is also generally considered a violation of the service agreement because non-subscribers or users other than the subscriber who owns the wireless router are provided access to the wireless routers and telecommunications services without paying a telecommunications carrier.

SUMMARY

To overcome the bandwidth and service agreement problems, the principles of the present invention provide for bandwidth aggregation within the terms of a subscriber agreement. To meet the terms of the subscriber agreement, a service provider may offer a subscriber agreement that enables the subscriber to have aggregated wireless services. The wireless services may be provided by wireless access points, such as wireless routers, that may be configured to have a private wireless communications interface and a public wireless communications interface. In one embodiment, a determination may be made as to whether a user of a wireless device is a subscriber of a wireless network when the user attempts to access the network via a residential wireless access point. A subscriber of the aggregated wireless services may utilize a wireless device, such as a personal computer or telephone, and communicate with other local wireless access points to achieve an aggregated bandwidth. In using the aggregated wireless services, a subscriber may log-on manually, semi-automatically, or automatically, and a visitor (i.e., a non-

subscriber or subscriber without aggregation rights) may be authenticated to gain access to the wireless access point for aggregated usage.

One embodiment of a system for enabling users of wireless devices to increase wireless communication bandwidth includes a server in communication with multiple wireless access points. The server may execute software configured to enable a wireless device to communicate with multiple wireless access points of a network during a communications session. The software, in response to determining that the wireless device attempts to communicate with a wireless access point of the network determines whether the user of the wireless device has a subscription to communicate with multiple wireless access points to aggregate bandwidth from the wireless access points, and enables the wireless device to access the network and communicate with the wireless access points if the user has the subscription agreement.

One embodiment of a method for enabling users of wireless devices to increase wireless communications bandwidth includes determining that a wireless device attempts to communicate with a wireless access point of a network. A determination as to whether the user of the wireless device has a subscription agreement to communicate with multiple wireless access points of the network to aggregate bandwidth from the wireless access points may be made. The wireless device may be enabled to communicate with the wireless access points if the user has the subscription agreement.

BRIEF DESCRIPTION OF THE DRAWINGS

Illustrative embodiments of the present invention are described in detail below with reference to the attached drawing figures, which are incorporated by reference herein and wherein:

FIG. 1 is an illustration of a system for providing aggregated wireless communications services;

FIG. 2 is an illustration of a system showing components within the system for providing aggregated wireless communications;

FIG. 3 is a flow diagram of an exemplary process for determining that a user is a subscriber of aggregated wireless communications services;

FIG. 4 is a screen shot of an exemplary log-in webpage for a user to access a network that provides aggregated wireless communications services; and

FIG. 5 is a screen shot of an exemplary webpage for enabling a user who is not a subscriber to temporarily pay for aggregated wireless communications services.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is an illustration of a system **100** for providing aggregated wireless communications services. The system **100** includes a central office or remote terminal **102** of a wireless communications network service provider that enables subscribers to have broadband aggregated wireless communications services. The subscribers may access the broadband aggregated wireless communications services at residential locations **104a-104n** (collectively **104**), such as a house, via wireless access points **106a-106n** (collectively **106**). The wireless access points **106** may be a wireless router or any other wireless access point that enables a user to have wireless access to a network. A wireless access point **106a** may include multiple antennas **108a(1)-108a(2)** (collectively **108a**) that are utilized to communicate with a user within the residential location **104a** and user outside of the residential location **104a**. A communications path (not shown), includ-

ing a transceiver and other communications devices as understood in the art, may be included within the wireless access point **106a** for communicating via each antenna **108a(1)** and **108a(2)**. In one embodiment, the wireless access point **106a** may communicate with a personal computer **110** or other device over a cable **112** using an Ethernet communications protocol or other communications protocol. In addition, a user may communicate with the wireless access point **106a** using a wireless device **114a**, such as a personal computer, mobile telephone, or other wireless device for communicating over a network **116** (e.g., the Internet).

In communicating with the wireless access point **106a**, the wireless device **114a** may wirelessly communicate using data packets **118** using a wireless communications protocol, such as WiFi, WiMax, or any other wireless communications protocol for communicating voice and/or data over the network **116**. The data packets **118** may be communicated via the wireless access point **106a** and over the network **116**.

As understood in the art, individual users tend to use only a small fraction of available bandwidth, as bandwidth is not utilized when communications are not being conducted. Data packets tend to be burst for short periods of time. When data packets are not being communicated, there is available bandwidth.

In accordance with the principles of the present invention, the wireless access points **106** may have a private communications interface and a public wireless communications interface. In one embodiment, each of the private and public wireless communications interfaces may be in communication with respective antennas **108a(1)** and **108a(2)**. Alternatively, both may be in communication with a single antenna **108a(1)**. The private wireless communications interface may be one that a subscriber at the residential location **104a** may access, but no other subscribers may access. The public wireless communications interface may be an interface that both the subscriber located at the residential location **104a** may use and a subscriber other than one located at the residential location **104a** may utilize. In other words, any wireless devices **104a-104n** (collectively **104**) that are within communication range of one of the wireless access points **106** that has a public wireless communications interface may communicate with that wireless access point and utilize unused bandwidth. Of course, a subscriber who owns the wireless access point **106a** may be given priority over other subscribers utilizing unused bandwidth of the wireless access point. For example, if the subscriber who owns the wireless access point **106a** decides to download a movie from the network **116**, that movie download would be given priority over other subscribers who are aggregating wireless communications by accessing the wireless access point **106a**.

As shown, each of the residential locations is provided a certain bandwidth. More specifically, residential location **104a** receives a 5 MB bandwidth, residential location **104o** receives a 10 MB bandwidth, and residential location **104n** receives a 30 MB bandwidth. These bandwidths are paid for by each of the respective subscribers, where the subscriber at residential location **104a** may pay less for a 5 MB bandwidth than a subscriber at residential location **104n** with a 30 MB bandwidth. If the subscriber at residential location **104a** is within wireless communication range of the wireless access point **106o**, the aggregated wireless communications for the subscriber at residential location **104a** is potentially a 15 MB bandwidth (i.e., the sum of the 5 MB and 10 MB bandwidths) while communicating with both the wireless access points **106a** and **106o**. If the subscriber at residential **104o** is in wireless communication range of wireless access points **106a** and **106n**, then the subscriber may have 45 MB bandwidth

(i.e., the sum of the 5 MB, 10 MB, and 30 MB bandwidth), and if the subscriber at residential location **104n** is in wireless communication range of the wireless access point **106o**, then the subscriber at residential location **104n** has a 40 MB bandwidth (i.e., the sum of the 10 MB and 30 MB bandwidth) while communicating with both wireless access points **106o** and **106n**.

FIG. 2 is an illustration of a system **200** showing components within the system for providing aggregated wireless communications. The system **200** may include wireless device **202** that may be a personal computer, laptop computer, telephone, game, or any other device that may utilize wireless communications. The wireless device **202** may include a processor **204** that executes software **206** that is utilized for providing functionality for a user of the wireless device and provides wireless communications, including aggregated wireless communications in accordance with the principles of the present invention, to enable the user to communicate with remote locations. The processor **204** may be in communication with a memory **208** that is used for storing data and executable software, input/output (I/O) unit **210** that performs communications with remote locations, and storage unit **212** that may store data for the wireless device **202**. An antenna **213** may be in communication with the I/O unit **210** for performing wireless communications to remote devices.

A wireless access point **214a** may include a processor **216** that executes software **218**. The software **218** may provide for both private and public wireless interface communications. The processor **216** may be in communication with memory **220** and I/O unit **222**. Antennas **223a** and **223b** may be in communication with the I/O unit **222** for providing both private and public wireless communications services to subscribers within range of the wireless access point **214a**. The software **218** may be configured to enable owners of the wireless access point **214a** to have unrestricted access to the wireless access point **214a** and have priority for wireless communications with the wireless access point **214a** over non-owners (i.e., other subscribers who are using the public wireless communications interface for aggregating wireless communications bandwidth) accessing the wireless access point **214a**. The wireless access point **214a** may be in communication with a network **224**, such as a telecommunications network, Internet, or other network. In one embodiment, the network **224** is a public switched telephone network (PSTN).

A server **226**, which may be operated by a telecommunications service provider or other service provider, may include a processor **228** that executes software **230**. The processor **228** may be in communication with memory **232**, I/O unit **234**, and storage unit **236**. Data repositories **237a-237n** (collectively, **237**) may be stored on the storage unit **236** and be utilized to store subscriber information of the service provider. In one embodiment, data stored in the data repositories **237** include subscribers who pay for aggregated wireless communications services, such that a subscriber may access multiple wireless access points **214a-214n** to receive increased wireless communications bandwidth.

The software **230** may be configured to determine when a wireless device is attempting to access a wireless access point **214a** to determine whether the wireless device is owned by the owner of the wireless access point. In the case of the wireless access point **214a** having a private and public wireless communications interface, the determination may be made to determine whether the wireless device is attempting to access the private or public wireless communications interface. This determination may be made in conjunction with software executing on the wireless access point **214a**. For

5

example, software being executed by the wireless access point **214a** may (i) generate a signal, including information representative of a wireless device (e.g., device number or IP address), in response to the wireless device attempting to communicate with the wireless access point **214a** and (ii) communicate the signal to the server **226** for the software **230** to compare the information representative of the wireless device with the information stored in the data repositories **237** to determine whether the wireless device is owned or being operated by a subscriber of the network. Still yet, if the wireless device is not owned by the owner of the wireless access point **214a**, then a determination may be made as to whether the user is a subscriber of the aggregated wireless network being serviced by the telecommunications service provider. A wireless device attempting to access the wireless access point may be indicative of the wireless device attempting to aggregate bandwidth or simply accessing the network without paying for the service, so the software may intercept and prevent such unauthorized access. If the user does not have a subscription for aggregated bandwidth services, then he or she may pay for limited access (see, FIGS. **4** and **5**).

FIG. **3** is a flow diagram of an exemplary process **300** for determining that a user is a subscriber of aggregated wireless communications services. The process **300** starts at step **302**. At step **304**, a determination is made that a wireless device attempts to communicate with a wireless access point of a network. At step **306**, a determination is made as to whether the user of the wireless device has a subscription agreement to communicate with multiple wireless access points of the network to aggregate bandwidth from the wireless access points. At step **308**, the wireless device is enabled to communicate with the wireless access points if the user has the subscription agreement allowing for aggregated wireless communication services. The process may be implemented using software and/or hardware of a telecommunications service provider. The process ends at step **310**.

FIG. **4** is a screen shot of an exemplary log-in webpage **400** for a user to access a network that provides aggregated wireless communications services. The webpage **400** may be generated and prompted to a user of a wireless device in response to attempting to access a wireless access point of the wireless aggregation network. The webpage **400** may request a user name and password input fields **402** and **404**, respectively. If the user is not a subscriber of the wireless aggregation network then the user may select a soft-button **406** indicating that he or she is not a subscriber. In response, the user may be provided another webpage (FIG. **5**) to receive an access pass to temporarily access the wireless aggregation network.

FIG. **5** is a screen shot of an exemplary webpage **500** for enabling a user who is not a subscriber to temporarily pay for aggregated wireless communications services. The webpage **500** may provide a message **502** that notifies the user that he or she is attempting to access the wireless aggregation network and that he or she is not a subscriber. The user may select a time period in a selectable element **504** that he or she wishes to have access to the wireless aggregation network. The user may enter payment type (e.g., credit card) in a selectable element **504**, such as a pull-down menu, name in a text entry field **506**, and expiration date of the payment type in a selectable element **508**. Software at a central location (e.g., server **226** of FIG. **2**) may store the user's information and enable the user utilizing a wireless device to have access to the wireless aggregation network for the selected time period. At the end of the time period, the user may be prompted with another webpage that allows the user to extend the time period or become a subscriber of the wireless aggregation network.

6

The previous detailed description is of a small number of embodiments for implementing the invention and is not intended to be limiting in scope. One of skill in this art will immediately envisage the methods and variations used to implement this invention in other areas than those described in detail. The following claims set forth a number of the embodiments of the invention disclosed with greater particularity.

What is claimed:

1. A system for enabling users of wireless devices to increase wireless communication bandwidth, said system comprising:

a server in communication with a plurality of wireless access points, said server executing software configured to enable a wireless device to simultaneously communicate with multiple wireless access points of a network during a communications session, the software, in response to determining that the wireless device attempts to communicate with a wireless access point of the network, determines whether the user of the wireless device has a subscription agreement to simultaneously communicate with multiple wireless access points to aggregate bandwidth from the wireless access points with which the wireless device is in communication, and enables the wireless device to access the network and communicate with the wireless access points if the user has the subscription agreement.

2. The system according to claim **1**, wherein the wireless access points are wireless routers.

3. The system according to claim **2**, wherein the wireless routers are configured to be utilized as residential properties of consumers.

4. The system according to claim **1**, wherein the software, in determining whether the user of the wireless device has a subscription to communicate with multiple wireless access points to aggregate bandwidth, queries the wireless device to determine the user name and password of the user.

5. The system according to claim **4**, wherein the query by the software to the wireless device causes the wireless device to prompt a user for the user name and password.

6. The system according to claim **1**, wherein the wireless device is a personal computer.

7. The system according to claim **1**, wherein the wireless device has priority when communicating with a home wireless access point of the user over other wireless devices communicating with the home wireless access point of the user.

8. The system according to claim **1**, wherein the wireless access points are configured with a private communications interface and a public communications interface, the wireless device communicating with the public communications interface of at least one of the wireless access points.

9. The system according to claim **1**, wherein the software is further configured to determine that the user is not a subscriber and query the wireless device to determine whether the user is willing to pay an access fee for communicating with multiple wireless access points to aggregate bandwidth.

10. The system according to claim **9**, wherein the software is further configured to authorize an access fee payment by the user prior to enabling the wireless device to communicate with multiple wireless access points to aggregate bandwidth.

11. A method for enabling users of wireless devices to increase wireless communications bandwidth, said method comprising:

determining that a wireless device attempts to communicate with a wireless access point of a network;
determining whether the user of the wireless device has a subscription agreement to simultaneously communicate

7

with multiple wireless access points of the network to aggregate bandwidth from the wireless access points with which the wireless device is in communication; and enable the wireless device to simultaneously communicate with the wireless access points if the user has the subscription agreement.

12. The method according to claim **11**, further comprising receiving a signal from a wireless access point indicative of a wireless device attempting to access the network, the wireless access point being located at a residential property.

13. The method according to claim **12**, wherein receiving a signal from a wireless access point includes receiving a wireless signal from a wireless router.

14. The method according to claim **11**, further comprising querying the wireless device to determine a user name and password of the user.

15. The method according to claim **14**, wherein querying the wireless device causes the wireless device to prompt the user for the user name and password.

16. The method according to claim **11**, wherein determining that a wireless device attempts to communicate with a

8

wireless access point includes determining that a personal computer attempts to communicate with a wireless access point.

17. The method according to claim **11**, further comprising prioritizing communications of the wireless device when communicating with a home wireless access point of the user over other wireless devices communicating with the home wireless access point of the user.

18. The method according to claim **11**, further comprising receiving communications from the wireless device from a public communications interface of at least one of the wireless access points having a private communications interface and a public communications interface.

19. The method according to claim **11**, further comprising: determining that the user is not a subscriber; and querying the wireless device to determine whether the user is willing to pay an access fee for communicating with multiple wireless access points to aggregate bandwidth.

20. The method according to claim **19**, further comprising authorizing an access fee payment by the user prior to enabling the wireless device to communicate with the wireless access points to aggregate bandwidth.

* * * * *